GSA Final Report

Total Solutions West

Scope of Project: Three HVAC units were being studied to determine the effect of the SRA ColdPLUS once injected into the compressor of each unit. A software monitoring program called e-Gauge is being employed as the metering device and analytics package.

The units are designated as GSARTU#1, GSARTU#2 and GSARTU#3. They represent three unique ac units located at GSA warehouse Building B810-S25. We were fortunate to have three different aged units so that we get an indication of the effect of ColdPLUS on different aged units.

Unit GSARTU#1 is a Carrier unit Model#: 38AUZA07A0A6A0A0A0A0, Series#: 2612C90072 3-phase 6.6 RTU and 15 years old

Unit GSARTU#2 is a Carrier unit Model#: 38AUZA12A0G06A0A0A0A0, Series#: 3409G30162 3-phase 10.0 RTU and 5 years old

Unit GSARTU#3 is a Carrier unit Model#: 38AUZA08AOA6A0A0A0 Series#: 2022C10916 3-phase 7.5 RTU and 1 year old

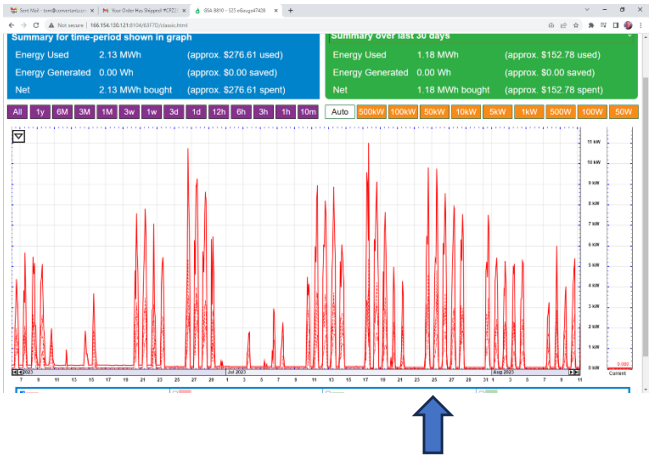
Meters were installed on these three units on April 12th, 2023 by EchoLabs, Inc. and a third party inspection was conducted by U.S Engineering Service on May 9th, 2023. We began metering on April 11, 2023. The ColdPLUS was installed on July 17th, 2023.

Installed meters recorded energy data from these three units in 1 minute (60 second) increments. This data was then rolled up into hours and then collected as daily kWh energy usages. Used data was recorded only when the compressor was active and drawing energy. Data was scrubbed for very high and very low numbers. Similar temperature and humidity daily data sets were compared to each other for both before and after the ColdPLUS installation.

As previously decided, to achieve a very high level of confidence, we designed a test that has a 95% confidence level with a 5% margin of error. To do so we would need 278 actual energy readings both before and after the ColdPLUS insertion. We have collected and analyzed more than 720 data points each day for over 120 days or 86,400 energy readings.

Calculating Carbon emissions at 0.857 pounds of CO_2 emissions per kWh. So, with the combined impact of these three units and in the period we studied them you used about 4.47 MKw and thus we can save roughly 16.6 % or **.341 tons of CO2**.

The ECHO Labs team started as the core technical capability within the broadband pioneer High Speed Access (HSA). ECHO Broadband acquired the core team from HSA in 2001 and deployed this new IP Group as a team to Europe for major IP Projects. 2002 ECHO Broadband was fully acquired by Keppel and the IP Business Group became a strategic component of Keppel's $150+ million annual turnover Network Engineering Group. The IP Business Group was privatized in 2003 as ECHO Labs. ECHO Labs maintains a close relationship with ECHO Broadband and has expanded its offering to include ASP and hosted solutions. Over 100,000 energy monitoring customers.



Visual relative energy expenditures

Insertion day July 17th

Date & Time	Usage [kWh]	Generation [kWh]	GSA RTU 1 [kWh]		GSA RTU 2 [kWh]		GSA RTU 3 [kWh]	
8/17/2023 13:00	3599.275037	0	-898.33235		-1394.416537		-1306.52615	
8/16/2023 13:00	3541.355383	57.91965417	-885.1618781	13.17047194	-1371.161579	23.2549575	-1285.031926	21.49422472
8/15/2023 13:00	3482.561313	58.79407056	-873.3529069	11.80897111	-1345.676862	25.4847175	-1263.531544	21.50038195
8/14/2023 13:00	3453.648081	28.91323194	-868.2277586	5.125148333	-1331.341072	14.33579028	-1254.07925	9.452293333
8/10/2023 13:00	3389.011368	64.6367125	-854.3802508	13.84750778	-1300.009148	31.33192333	-1234.621969	19.45728139
8/9/2023 13:00	3353.718056	35.29331194	-847.5926003	6.787650555	-1282.732782	17.27636667	-1223.392674	11.22929472
8/8/2023 13:00	3328.067344	25.65071194	-843.0675867	4.525013611	-1268.607425	14.12535695	-1216.392333	7.000341389
8/7/2023 13:00	3303.728043	24.33930139	-839.90404	3.163546667	-1255.818457	12.78896778	-1208.005546	8.386786945
8/4/2023 13:00	3272.224683	31.50336028	-834.3245417	5.579498333	-1241.137604	14.68085333	-1196.762537	11.24300861
8/3/2023 13:00	3234.298908	37.92577472	-827.6948164	6.629725278	-1223.715268	17.42233528	-1182.888823	13.87371417
8/2/2023 13:00	3197.838225	36.46068306	-821.6139961	6.080820278	-1209.27241	14.44285833	-1166.951819	15.93700445
8/1/2023 13:00	3159.455056	38.38316889	-815.1458628	6.468133333	-1191.344295	17.92811472	-1152.964898	13.98692083
7/31/2023 13:00	3109.420356	50.03469944	-804.4956472	10.65021556	-1170.601759	20.74253639	-1134.32295	18.6419475
7/30/2023 13:00	3071.171131	38.24922528	-797.221105	7.274542222	-1156.525504	14.07625472	-1117.424522	16.89842833
7/27/2023 13:00	2981.42662	89.74451083	-771.9385261	25.28257889	-1123.211911	33.31359306	-1086.276183	31.14833889
7/26/2023 13:00	2918.742372	62.68424806	-757.1716228	14.76690333	-1097.666711	25.54519972	-1063.904038	22.372145
7/25/2023 13:00	2842.194341	76.54803111	-741.2257633	15.94585945	-1066.474964	31.19174695	-1034.493613	29.41042472
7/24/2023 13:00	2772.993996	69.20034528	-727.2146003	14.01116306	-1039.303634	27.17133	-1006.475761	28.01785222
7/23/2023 13:00	2729.043885	43.95011056	-718.2677958	8.946804445	-1021.669001	17.63463361	-989.1070886	17.3686725
7/17/2023 13:00	2491.620731	237.4231547	-669.7489497		-926.7358811		-895.1358997	coldplus added
7/16/2023 13:00	2439.065499	52.55523195	-653.2278472		-907.3254519		-878.5121994	
7/14/2023 13:00	2409.548755	29.51674333	-643.8162497	9.4115975	-895.1212453	12.20420667	-870.6112603	7.900939166
7/13/2023 13:00	2336.224802	73.32395333	-626.8570531	16.95919667	-862.7581692	32.36307611	-846.6095797	24.00168056
7/12/2023 13:00	2260.537776	75.68702639	-609.1451064	17.71194667	-831.4049025	31.35326667	-819.9877667	26.62181306
7/11/2023 13:00	2183.088068	77.4497075	-594.0154531	15.12965333	-797.0136247	34.39127778	-792.0589903	27.92877639
7/10/2023 13:00	2127.619331	55.46873694	-583.2625433	10.75290972	-767.5112056	29.50241917	-776.8455822	15.21340806
7/3/2023 13:00	2055.622953	71.99637806	-567.2888008	15.9737425	-726.9974869	40.51371861	-761.3366653	15.50891694
6/27/2023 13:00	1874.553715	181.0692381	-520.5006672	46.78813361	-653.106075	73.89141194	-700.9469728	60.3896925
6/26/2023 13:00	1783.09727	91.456445	-498.3136217	22.18704555	-616.8835917	36.22248333	-667.9000567	33.04691611
6/25/2023 13:00	1750.480073	32.61719694	-491.9294136	6.384208056	-602.9943728	13.88921889	-655.5562867	12.34377
6/23/2023 13:00	1721.244915	29.23515778	-483.5927919	8.336621667	-590.021555	12.97281778	-647.6305683	7.925718334
6/22/2023 13:00	1682.815919	38.42899639	-477.2244631	6.368328888	-573.7101175	16.3114375	-631.8813383	15.74923
6/21/2023 13:00	1632.899513	49.91640583	-466.6948281	10.529635	-550.4087714	23.30134611	-615.7959136	16.08542472
6/20/2023 13:00	1565.897479	67.00203417	-452.9112178	13.78361028	-520.9301892	29.47858222	-592.0560719	23.73984167
6/19/2023 13:00	1533.048164	32.849315	-446.7870875	6.124130278	-504.1590758	16.77111333	-582.1020006	9.954071388
6/15/2023 13:00	1503.229851	29.81831278	-438.9547844	7.832303056	-491.8675353	12.29154056	-572.4075314	9.694469167
6/8/2023 13:00	1376.52606	126.7037914	-416.4451264	22.50965806	-426.8129472	65.05458806	-533.2679861	39.13954528
6/7/2023 13:00	1338.805629	37.72043111	-407.1322678	9.312858611	-410.7643231	16.04862417	-520.9090378	12.35894833
6/6/2023 13:00	1298.653002	40.15262667	-396.6938428	10.438425	-394.1717606	16.5925625	-507.7873986	13.12163917
6/5/2023 13:00	1271.250749	27.4022525	-391.1534272	5.540415556	-382.2155031	11.9562575	-497.8818192	9.905579444
6/2/2023 13:00	1220.800197	50.45055222	-376.8023897	14.3510375	-365.4156214	16.79988167	-478.5821861	19.29963306
6/1/2023 13:00	1176.034578	44.76561889	-362.9449058	13.85748389	-350.8708336	14.54478778	-462.2188389	16.36334722
5/31/2023 13:00	1125.762282	50.27229611	-347.3235758	15.62133	-333.859535	17.01129861	-444.5791714	17.6396675
5/30/2023 13:00	1062.859004	62.90327833	-331.7849794	15.53859639	-309.1033783	24.75615667	-421.9706461	22.60852528
5/29/2023 13:00	1029.861768	32.99723639	-324.8389378	6.946041666	-295.6226283	13.48075	-409.4002014	12.57044472
5/26/2023 13:00	1005.632689	24.22907806	-316.0658958	8.773041945	-289.0982314	6.524396944	-400.4685622	8.931639167
5/25/2023 13:00	952.9176333	52.71505611	-305.7777842	10.28811167	-268.4172683	20.68096306	-378.7225808	21.74598139
5/24/2023 13:00	924.3036022	28.61403111	-301.3632844	4.414499723	-255.2798914	13.13737694	-367.6604264	11.06215444
5/23/2023 13:00	867.9662439	56.33735833	-284.0884475	17.27483694	-237.4528036	17.82708778	-346.4249928	21.23543361
5/22/2023 13:00	814.7710278	53.19521611	-272.07605	12.0123975	-215.3755258	22.07727778	-327.3194519	19.10554083
5/16/2023 13:00	703.9678994	110.8031283	-251.2431664	20.83288361	-171.2410764	44.13444944	-281.4836567	45.83579528
5/15/2023 13:00	680.4391781	23.52872139	-249.4376525	1.805513889	-160.8244919	10.41658445	-270.1770336	11.30662306
5/9/2023 13:00	614.8484783	65.59069972	-231.5235703	17.91408222	-141.5815911	19.24290083	-241.7433169	28.43371667
5/8/2023 13:00	563.9325256	50.91595278	-213.5891569	17.93441333	-127.6036919	13.97789917	-222.7396767	19.00364028
5/7/2023 13:00	539.3095111	24.62301445	-205.9755594	7.6135975	-121.5231803	6.080511666	-211.8107714	10.92890528

	After	Before		total
	870.2312	1952.311219		
	45.80164	55.78032056	9.978681	18%

GSARTU#1	After	Before		
	180.0646	447.2522878		
	10.00359	13.15447905	3.150893	24%

GSARTU#2	After	Before		
	372.7475	785.8022717		
	20.7082	23.11183152	2.403635	10%

GSARTU#3	After	Before		
	317.4191	666.7014281		
	17.63439	19.60886553	1.974473	10%

Captured before and after data

Analysis

	GSARTU1	GSARTU2	GSARTU3
	7.293	15.473	9.568
	20.495	31.924	30.758
	21.262	35.865	31.959
	18.534	32.775	29.529
AVG:	16.896	29.009	25.453

	GSARTU1	GSARTU2	GSARTU3
	7.420	17.743	14.318
	13.307	25.713	21.925
	12.205	28.134	20.708
	2.765	4.994	20.708
AVG:	8.924	19.146	19.415

BEFORE ColdPLUS

	GSARTU1	GSARTU2	GSARTU3
	1.808	7.764	5.073
	6.959	21.534	16.243
	9.588	22.300	16.843
	10.472	15.020	12.529
AVG:	7.207	16.655	12.672

before average:	12.103	23.943	20.419

3 average kWh sets from June 18th to July 16th for each of the three AC units. Values determined by subtracting the daily kWh period from the prior daily kWh period. Combined values are averaged.

	GSARTU1	GSARTU2	GSARTU3
	7.332	20.557	13.604
	5.817	14.383	7.570
	3.836	14.039	9.449
	2.296	10.016	6.950
avg:	4.820	19.665	12.524

	GSARTU1	GSARTU2	GSARTU3
	6.896	16.019	16.243
	6.415	16.470	14.401
	7.722	18.303	15.230
	11.093	21.056	21.829
avg:	8.031	17.962	16.926

After ColdPLUS

	GSARTU1	GSARTU2	GSARTU3
	4.694	11.795	10.719
	10.972	22.744	20.781
	16.919	28.521	34.041
	24.482	35.835	32.241
avg:	14.267	24.724	24.445

after average:	9.039	20.783	17.965

3 average kWh sets from July 18th to August 16th for each of the three AC units. Values determined by subtracting the daily kWh period from the prior daily kWh period. Combined values are averaged.

Final ANALYSIS

	GSARTU1	GSARTU2	GSARTU3
Before ColdPLUS:	12.103	23.943	20.419
After ColdPLUS 7/17/23	9.039	20.783	17.965
After ColdPLUS 7/17/25	9.1	17.3	14.6
Difference 7/17/23	25%	13%	12%
Difference 7/17/25	25%	27%	28%

We have included both the initial and final reports from the Government Services Administration (GSA) pilot program for your reference. The GSA manages over 370 million square feet of space across the United States. In July 2023, we conducted a pilot application on three AC units (10-ton, 7.5-ton, and 6-ton) at a GSA facility. The detailed results are attached and reflect impressive outcomes.

On July 17, 2023, monitors were installed on three AC units at Building 810 on the GSA campus in Denver, Colorado, tracking energy use for six weeks prior to the introduction of the Cold Plus additive. Post-installation, the report documents remarkable energy reductions achieved. Initial results in 2023 demonstrated a 12% reduction in energy use for a one-year-old 7.5-ton unit, a 13% reduction for a five-year-old 10-ton unit, and a 25% reduction for a 13-year-old 6-ton unit.

After two years, subsequent testing showed further improvements: the one-year-old unit's reduction increased from 12% to 28%, the five-year-old unit's reduction rose from 13% to 27%, and the 6-ton unit maintained a consistent 25% reduction, with no reported damage to any compressor components, highlighting the solution's reliability and durability.